

# **Pressure Effects on the Viscosity of Water and Aqueous Sugar Solutions at Low and Moderate Temperatures in Comparison to Concentration and Temperature Effects**

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The knowledge of the pressure viscosity behavior of water and aqueous solutions is essential in many fields of science and engineering; e.g. the high pressure processing of foods which is a novel technology with various advantages [1]. The knowledge of the viscosity provides novel insights into the processes occurring under high pressure.

In the presented work new experimental data for the viscosity of water up to a maximum pressure of 700 MPa in the temperature range of -13 °C to 40 °C are shown. Furthermore, the pressure viscosity behavior of aqueous sugar solutions (sucrose, glucose) is studied. The pressure dependence of the viscosity of sugar solutions was measured in the temperature range between 5 °C and 60 °C and in the concentration range between 0,01 and 0,60 (w/w). The measurements were carried out with two different types of viscometer; both gravity driven. The set-up of the viscometers and the pressure dependent corrections are briefly described. For water, comparisons with literature data are carried out and the reasons for possible deviations are discussed. Also, for water it is shown that there exists a local viscosity minimum, the position of which is temperature dependent and shows an increase with decreasing temperature. The minimum is between 100 and 200 MPa in the temperature range considered here. The minimum becomes more pronounced with decreasing temperature. The pressure viscosity behavior of sugar solutions is discussed in comparison to water. The effect of pressure on the viscosity is compared to the effect of concentration and temperature.

[1] C. Balny, R. Hayashi, K. Heremans, P. Masson, High Pressure and Biotechnology. Montrouge: John Libbey/INSERM 1992~~p